Inequality and Growth: The Role of Beliefs and Culture*

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Abstract

In egalitarian countries people believe that luck rather than hard work determines success in life and expect their government to provide both economic growth and social equity. This leads to a stronger dynamic interplay between government interventions, inequality and growth within such countries. The presented results thus confirm the importance of cultural factors and economic beliefs in shaping the inequality-growth link. More fundamentally, the paper demonstrates that cultural background does not only influence the long-run economic outcomes, but can also affect the joint dynamics of real economic variables within countries over time.

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1 Introduction

The question whether inequality promotes or hinders economic growth is among the most controversial ones in the whole field of growth and development. In the last 15 years there has been a growing literature on the subject making use of ever more advanced econometric techniques, but a clear answer seems still out of reach. This paper departs from this body of literature and stresses the role of beliefs and cultural factors in the inequality-growth nexus. Standard political economy models assume that high inequality induces the median voter to support a distortionary redistribution with adverse consequences for growth. This mechanism is supposed to operate in the same way within all countries from Scandinavia to the United States. I examine whether the joint dynamics of inequality, redistribution and growth within countries differ because of their different cultural background.

This paper claims that governments are altering the level of state interventions in order to provide both economic growth and social equity demanded by voters at a given point in time. In some periods public focus is on economic growth and hence policy leads to increases in both growth and inequality. In other periods equality considerations dominate the political debate, the resulting surge in regulation and redistribution leads to a decrease in inequality and worsening of the economic performance. Such mechanism generates a positive co-movement between inequality and growth within countries over time.

The main point of this study is that the cultural background of countries affects the intensity of the pattern outlined above. The idea of altering the scope of government in order to regulate the level of inequality tends to prevail in (egalitarian) countries that for cultural reasons consider inequality unfair. On the contrary, public support for such fine-tuning will be rather limited in the (laissez-faire) countries where the electorate views affluence as a deserved outcome of hard work. As a result, one would expect stronger positive co-movement of inequality and growth over time in culturally egalitarian countries.

To formalize this theory, I use the theoretical framework set out in Alesina and Angeletos (2005). This seminal work shows how the demand for fairness generates complementarity between beliefs and politico-economic outcomes. Such complementarity can then lead to multiple steady states. On the one hand, the US steady state (laissez-faire countries in the terminology of this paper) is characterized by less redistribution and widespread belief that success in life is the result of hard work. On the other hand, agents operating in the EU steady state (i.e. the population of egalitarian countries) believe that luck determines success in life and therefore support a bigger economic role for the government. The specific historical experience, in the form of different initial conditions or of different shocks, determines in which of the two steady states the country ends up.

Alesina and Angeletos (2005) focus on the steady state properties of the two

equilibria. I am interested in the economic implications of shocks to fairness preference in the egalitarian versus the laissez-faire regime. I show that in egalitarian countries an increased preference for fairness translates into higher level of redistribution. In the laissez-faire countries the effect of such preference shock on the redistribution level displays in general a smaller magnitude and has an ambiguous sign. The intuition for this result is simple. In countries where people believe in the injustice of inequality, increased preference for fairness transmits directly into higher demand for redistribution. The same preference shift produces smaller increases or even decreases of government interference in the laissez-faire regime, in which social beliefs equate redistribution to the expropriation of hard-working rich people.

In the empirical part of the paper I employ the question from the World Value Survey asking the respondents whether success in life depends more on hard work or on luck and connections. One would expect that public demand for egalitarian outcomes is higher in countries where successful people are considered to be rather lucky than hard-working. Alesina and Angeletos (2005) - building on previous work by Alesina et al. (2001) - provide some cross-sectional empirical evidence for this conjecture. Both papers use the same WVS question and show that a stronger belief in luck as main determinant of success is associated with a higher share of social spending in GDP. In this paper I utilize this social belief to empirically test whether the within dynamics of state intrusion, inequality and growth differ between egalitarian and laissez-faire countries. I do so in three steps.

First, I tackle the endogeneity issue concerning such surveys. The expressed beliefs reflect both the deep cultural attitudes and the feedbacks from the real economy. I use the shares of various religious denominations in the population as instrumental variables for the average survey response in a given country. Religious composition serves here as a proxy for a broader notion of cultural differences across countries. Thus, the instrumented value of the survey response represents the culturally determined component of people's attitudes toward social equity. I use this value to divide the countries into egalitarian and laissez-faire societies.

Second, I present some evidence for the described mechanism involving the joint development of three economic variables over time. The changes in inequality and government interventions over time are negatively correlated both within laissez-faire and egalitarian countries. The correlation is however stronger in the egalitarian group. The difference between mean correlations of the two country groups is both quantitatively important and statistically significant (3% level). The within correlation of changes in government interventions and economic growth is not significant for laissez-faire countries, but negative for egalitarian ones.

Finally, I test whether the cultural background matters in the reduced form dynamics of inequality and growth over time. I find that these two variables

exhibit stronger positive co-movement within egalitarian countries than within the laissez-faire ones. Various panel data estimation techniques capturing the within dynamics over time (fixed effects, system GMM and bias-corrected Least-Square Dummy Variable) confirm that the coefficient of inequality in the growth regression is significantly higher in egalitarian countries.

These results contribute to two strands of the literature.

First, the results indicate that culture might play an important role in the complex relationship between inequality and growth. This contributes to the empirical work that tries to identify the causal effects of income distribution on economic performance. The renewed interest in this question started with the seminal contributions of Alesina and Rodrik (1994) and Persson and Tabellini (1994) who provided empirical evidence for a negative effect. The subsequent cross-sectional studies confirmed this result, but the later use of panel data estimation challenged the emerging consensus. Both Li and Zou (1998) applying fixed effects estimation and Forbes (2000) using difference GMM approach found a positive and significant relationship between inequality and growth in the short and medium term.[1] Empirical evidence has remained inconclusive since. Estimations relying on cross-section estimations mostly find negative coefficient estimates, while methods focusing on the time-series component of variations (fixed effects, GMM estimation) tend to report a positive link. The longer the chosen growth period, the lower the coefficient of the inequality measure in the growth regression.[2] Given this diverse and sometimes contradictory evidence, subsequent papers applied various and increasingly advanced econometric techniques and tried to identify the possible non-linearities in the inequality-growth nexus. Barro (2000) uses random effects and 3SLS estimator and argues that the link is positive for rich countries and negative for poor ones. Banerjee and Duflo (2003) employ kernel estimation and suggest that both positive and negative changes in inequality are associated with lower economic growth. Voitchovsky (2005) applies the system GMM estimator and finds evidence for a positive (negative) effect of inequality at the top (bottom) end of the income distribution. This paper offers a fundamentally different explanation relying on deep cultural characteristics of countries. The presented results indicate that cultural factors could be an important driving force behind the observed evolution of inequality and growth. To my knowledge such possibility has not been examined so far.

Second, the paper contributes to the emerging field of cultural economics. The idea that culture matters for economic outcomes has attracted a lot of attention in recent years. The interested reader can turn to Tabellini (2007) and Fernan-

[1] Even if this is not necessarily at odds with the cross-sectional evidence of a negative link in the long run. For details see Forbes (2000).

[2] For an overview of this growing literature see e.g. de Dominicis, de Groot and Florax (2006).

dez (2007) for an excellent analysis of the current state and future perspectives in this promising research program. So far empirical work in this area focused on cross-sectional variation across countries or regions. In this literature the economic significance of cultural factors shows up in the different long-run economic outcomes across culturally diverse geographical units. This paper raises the possibility that the cultural background can also affect the joint evolution of economic variables within countries over time. This result might be seen as a complement to the existing evidence on the link between culture and long-term economic outcomes.

The remainder of the paper is organized as follows: The next section introduces a straightforward extension into the model of Alesina and Angeletos (2005) and shows how variation in the strength of preference for fairness can generate the patterns outlined above. Sections 3, 4 and 5 constitute the empirical part of the paper. Section 3 lays out the instrumentation strategy and econometric methodology. Section 4 presents the data and section 5 the empirical results. Section 6 concludes.

2 Theoretical Model

This section introduces an exogenous shock to the preference for fairness into the theoretical model of Alesina and Angeletos (2005). This allows examining the impact of prevailing beliefs on the joint dynamics of government interventions, inequality and economic growth within countries. I show that in egalitarian countries an increase in fairness preference generates an increase in the redistribution level. In laissez-faire countries the same preference shock has qualitatively ambiguous and quantitatively smaller impact on the level of redistribution. In the model, more redistribution leads in turn to a lower inequality and slower economic growth. The presence of shocks to preference for fairness will thus produce a stronger positive co-movement of inequality and growth within the egalitarian countries compared to the laissez-faire ones.

Alesina and Angeletos (2005) study a non-overlapping-generations model. Each generation consists of a continuum of agents indexed by $i \in [0, 1]$, who live for one period. The pre-tax wealth of agent from dynasty i and generation t is given by:

$$y_{it} = A_{it}e_{it} + \eta_{it} + k_{it-1} \tag{1}$$

where A_{it} denotes innate talent, e_{it} effort, η_{it} luck and k_{it-1} the bequest (or more generally parental investment) of the previous generation. The agent's budget constraint writes:

$$\begin{aligned} c_{it} + k_{it} &= w_{it} \equiv (1-\tau_t)y_{it} + G_t \\ \text{with } G_t &= \tau_t \overline{y_t} \text{ and } \overline{y_t} = \int_i y_{it} di \end{aligned} \tag{2}$$

where c_{it} denotes consumption, k_{it} bequest left to the next generation, w_{it} is the disposable wealth, τ_t is the tax rate, G_t lump-sum transfer and $\overline{y_t}$ represents the mean income in generation t. Individual preferences reflect both selfish motives and an altruistic desire for a fair social outcome:

$$U_{it} = u_{it} - \gamma \Omega_t \tag{3}$$

with u_{it} denoting the private utility derived from own consumption c_{it}, parental investment k_{it} and effort e_{it}. In particular:

$$u_{it} = V_{it}(c_{it}, k_{it}, e_{it}) = \frac{1}{(1-\alpha)^{1-\alpha}\alpha^{\alpha}}(c_{it})^{1-\alpha}(k_{it})^{\alpha} - \frac{1}{2\beta_{it}}(e_{it})^2$$

where β_{it} captures the willingness to work and the constant $\frac{1}{(1-\alpha)^{1-\alpha}\alpha^{\alpha}}$ is just a convenient normalization. Besides their private utility, agents also exhibit a distaste for social injustice:

$$\Omega_t = \int_i (u_{it} - \widehat{u}_{it})^2 \tag{4}$$

where u_{it} denotes the actual level of utility and $\widehat{u}_{it}$ the fair level of utility. The latter is defined as the utility achieved by the dynasty due to talent and effort and not luck or government transfers. In particular:

$$\widehat{u}_{it} = V_{it}(\widehat{c}_{it}, \widehat{k}_{it}, e_{it})$$

where $\widehat{c}_{it}$ and $\widehat{k}_{it}$ denote the fair (luck-free) levels of consumption and parental investment defined below.

Heterogeneity in the population is thus characterized by the distribution of $(A_{it}, \beta_{it}, \eta_{it})$. For simplification let us define $\delta_{it} \equiv (A_{it})^2\beta_{it}$, $\sigma_\delta^2 \equiv Var(\delta_i)$, $\sigma_\eta^2 \equiv Var(\eta_i)$ and $\Delta \equiv \overline{\delta} - \delta_m$ with $\overline{\delta}$ and δ_m denoting the mean and median of δ_i, respectively. Parameters δ_{it} and η_{it} are i.i.d. across agents but fully persistent over time. Further assumptions include $Cov(\delta_i, \eta_i) = 0$, and zero mean and median for η_{it}. The economy is thus parametrized by $E \equiv (\Delta, \gamma, \alpha, \sigma_\delta^2, \sigma_\eta^2)$. The parameters Δ and γ capture the two sources of support for redistribution: the traditional selfish motive arising if the median voter is poorer than the average ($\Delta > 0$) and the altruistic motive originating in the desire for fair social outcomes ($\gamma > 0$).

The optimizing agents choose consumption, effort and parental investment (c_{it}, e_{it}, k_{it}) to maximize the utility subject to their individual budget constraint while taking the aggregate outcomes (Ω_t, τ_t, G_t) as given. Due to the Cobb-Douglas functional form of private utility, the resulting optimal levels of consumption and parental investment become

$$c_{it} = (1-\alpha)w_{it} \text{ and } k_{it} = \alpha w_{it}$$

Accordingly, the utility of household i in generation t amounts to $u_{it} = w_{it} - \frac{1}{2\beta_{it}}(e_{it})^2$ implying the following optimal level of effort:

$$e_{it} = (1-\tau_t)A_{it}\beta_{it}$$

Given these outcomes of individual optimization, one can define the fair levels of consumption and parental investment. Intuitively, those are the levels that would be achieved in the absence of pure luck η_{it} and social transfers. Formally:

$$\begin{aligned} \widehat{c}_{it} &= (1-\alpha)\widehat{y}_{it} \text{ and } \widehat{k}_{it} = \alpha\widehat{y}_{it} \\ \widehat{w}_{it} &= \widehat{y}_{it} = A_{it}e_{it} + \widehat{k}_{it-1} \end{aligned}$$

Iterating the latter expression backwards yields the fair level of wealth, which reflects the cumulative effect of talent A_{it} and effort e_{it} over the whole history of dynasty i:

$$\widehat{w}_{it} = \widehat{y}_{it} = \sum_{s \leq t} \alpha^{s-t} A_s^i e_s^i \tag{5}$$

Analogously, the difference between actual and fair wealth $w_{it} - \widehat{w}_{it}$ represents the overall effect of luck and redistribution on the wealth accumulated by the dynasty. Furthermore, because of quasi-linearity of private utility in wealth, $u_{it} - \widehat{u}_{it} = w_{it} - \widehat{w}_{it}$ for every i, which implies that aggregate social injustice $\Omega_t = \int_i (u_{it} - \widehat{u}_{it})^2$ reduces to:

$$\Omega_t = Var(w_{it} - \widehat{w}_{it})$$

Alesina and Angeletos (2005) show in the technical appendix to their paper that for a given stationary history of taxation ($\tau_s = \tau$ for all previous generations $s \leq t-1$), the private utility of the median voter is given by:

$$u_{mt} = -\frac{1}{2}\tau_t^2 + \tau_t[(1-\tau_t) + \frac{\alpha(1-\tau)^2}{1-\alpha(1-\tau)}]\Delta$$

and the overall level of social injustice is:

$$\Omega_t = [(1-\tau_t)\tau_t - \frac{\alpha(1-\tau)^2}{1-\alpha(1-\tau)}(1-\tau_t) + \frac{\alpha(1-\tau)}{1-\alpha}]^2\sigma_\delta^2 + (1-\tau_t)^2[1+\frac{\alpha(1-\tau)}{1-\alpha(1-\tau)}]^2\sigma_\eta^2$$

Under the assumption that the government chooses the tax rate τ_t in order to maximize the welfare of the median agent, the optimal tax rate for the current generation is then $\tau' = \phi(\tau; E)$ with

$$\begin{aligned} \phi(\tau;E) \equiv & \arg\min_{\tau_t\in[0,1]}\{\frac{1}{2}\tau_t^2 - \tau_t[(1-\tau_t)+B]\Delta \\ & +\gamma[(1-\tau_t)(\tau_t - B) + A]^2\sigma_\delta^2 \\ & +\gamma(1-\tau_t)^2[1+A]^2\sigma_\eta^2\} \\ \text{with } A = & \frac{\alpha(1-\tau)}{1-\alpha(1-\tau)} > 0 \text{ and } B = \frac{\alpha(1-\tau)^2}{1-\alpha(1-\tau)} > 0 \end{aligned} \tag{6}$$

The optimal tax rate is thus increasing in the difference between the average and the median agent (Δ), reflecting the standard selfish motive for redistribution.[3] If the preference for fairness is present ($\gamma > 0$), the optimal tax rate depends also on the sources of income inequality (σ_δ^2 versus σ_η^2). Alesina and Angeletos focus on the fact that multiple steady states emerge in an environment with preference for fairness. The US steady state is characterized by lower taxation, less distortions (and thus higher output), higher inequality and fairer outcomes as captured by the ratio $\frac{Var(\widehat{y}_{it})}{Var(y_{it}-\widehat{y}_{it})}$ than the EU steady state. Throughout their analysis the authors hold all the parameters including the strength of fairness preference (γ) constant.

For the purpose of this paper, I am rather interested in how a small change in preference for fairness affects the level of redistribution in countries with different levels of (observed) social injustice.[4] My argument is the following. Parameter γ is supposed to capture a deep human need for fairness. However, people are more selfish in some periods and less in others. To use an extreme example, a natural disaster can bring the best (or worst) in the population of a country. At the same time, there is little reason to think that people in some countries are intrinsically more selfish than in others. I therefore assume that γ does not vary

[3] Note that both mean and median of luck η equal zero, so that the difference between average and median voter originates solely in the heterogeneity of skills and work ethos captured by $\Delta \equiv \overline{\delta} - \delta_m$.

[4] In the model agents can perfectly observe the aggregate outcomes including the level of social injustice Ω. Thus, for the purposes of this section observed values of Ω, σ_δ^2, σ_η^2 etc. equal their true values. The empirical part of the paper relaxes this assumption.

across countries, but is not perfectly stable over time. Technically, I introduce an exogenous shock to γ which occurs in the steady state.

Redistribution is supposed to bring about more fairness in a society. A change in preference for fairness will therefore have an effect on the redistribution level demanded by the median agent. Crucially, this effect will depend on how unfair she perceives the existing inequality in society to be in the first place. On the one side, the inequality originating in the heterogeneity of skills (A_i) and work ethos (β_i) - as captured by (σ_δ^2) - is considered to be fair. On the other side, the inequality generated by different luck of agents - captured by (σ_η^2) - is seen as undeserved. Thus, the question is whether the relative importance of pure luck (σ_η^2) versus skills and work ethos (σ_δ^2) matters for the sign and magnitude of the derivative $\frac{\partial \tau_t}{\partial \gamma}$.

The benevolent government chooses the optimal current tax τ_t taking the history of taxation τ as given. Computing the first order condition from (6) then yields:

$$\begin{aligned} 0 &= \tau_t - [(1-\tau_t)+B]\Delta + \tau_t\Delta \\ &+2\gamma[(1-\tau_t)(\tau_t - B)+A][1-2\tau_t+B]\sigma_\delta^2 \\ &-2\gamma(1-\tau_t)[1+A]^2\sigma_\eta^2 \end{aligned}$$

The application of the implicit function theorem allows then to express the effect of a small change in the preference for fairness (γ) on the optimal level of redistribution. To make the point clear, I focus on the extreme cases, i.e. when observed inequality arises only due to heterogeneity of luck ($\sigma_\delta^2 = 0$) or originates exclusively in different skills and work ethos ($\sigma_\eta^2 = 0$):[5]

$$\begin{aligned} \sigma_\delta^2 &= 0: \\ \frac{\partial \tau_t}{\partial \gamma} &= \frac{(1-\tau_t)[1+A]^2\sigma_\eta^2}{\frac{1}{2}+\Delta+\gamma[1+A]^2\sigma_\eta^2} > 0 \end{aligned} \tag{7}$$

$$\begin{aligned} \sigma_\eta^2 &= 0: \\ \frac{\partial \tau_t}{\partial \gamma} &= -\frac{[(1-\tau_t)(\tau_t-B)+A][1-2\tau_t+B]\sigma_\delta^2}{\frac{1}{2}+\Delta+\gamma\{[1-2\tau_t+B]^2-2[(1-\tau_t)(\tau_t-B)+A]\}\sigma_\delta^2} \end{aligned} \tag{8}$$

[5] The general expression for the derivative $\frac{\partial \tau_t}{\partial \gamma}$ writes: $\frac{2(1-\tau_t)[1+A]^2\sigma_\eta^2 - 2[(1-\tau_t)\tau_t - B(1-\tau_t)+\frac{\alpha(1-\tau)}{1-\alpha}][1-2\tau_t+B]\sigma_\delta^2}{1+2\Delta+2\gamma[1+A]^2\sigma_\eta^2+2\gamma\{[1-2\tau_t+B]^2-2[(1-\tau_t)\tau_t-B(1-\tau_t)+\frac{\alpha(1-\tau)}{1-\alpha}]\}\sigma_\delta^2}$

In this paper's terminology, the first case describes egalitarian countries and the second relates to the laissez-faire ones. The expressions are rather complicated, but one can identify several patterns. If the inequality is due to pure luck, an increase in the preference for fairness leads unambiguously to higher redistribution. If different skills and work ethos are the sources of different income, then the sign of $\frac{\partial \tau_t}{\partial \gamma}$ is ambiguous. Another matter of interest concerns the magnitude of the effect. One additional assumption is needed for a meaningful analysis of this issue. The preference for fairness (γ) has to be relatively small compared to the selfish motive for redistribution captured by $\frac{1}{2} + \Delta$. This assures that the denominator in (8) remains positive and does not get close to zero. Without this additional assumption, a small change in the parameters could lead to switching of $\frac{\partial \tau_t}{\partial \gamma}$ between zero, infinity and minus infinity.[6]

Even if the denominator in (8) is positive, the sign of the numerator and hence of the whole expression remains ambiguous. Numerical simulations show that a lower level of redistribution and a higher share of wealth allocated to parental investment (α), are associated with a negative $\frac{\partial \tau_t}{\partial \gamma}$ in laissez-faire countries where luck does not affect the income distribution ($\sigma_\eta^2 = 0$). Additionally, the absolute magnitude of $\frac{\partial \tau_t}{\partial \gamma}$ is smaller in the laissez-faire countries. This holds true when parameters other than σ_δ^2 and σ_η^2 are equal for both countries' groups and also if one allows for reasonably higher level of redistribution in the egalitarian countries.

A preference shock has thus in general a smaller impact on redistribution in countries where agents observe fair origins of inequality. The intuition is the following. If the inequality arises from pure luck, the median voter desires redistribution in order to correct this outcome. The increase in preference for fairness (positive shock to γ) then unambiguously leads to a surge in the demand for redistribution. If the inequality originates in differing skills and work ethos, the median voter faces a trade-off between her selfish interest (Δ) and her desire for social justice (γ). Redistribution increases her private utility by transferring wealth from the average agent. At the same time, such redistribution expropriates hard working agents with better skills and hence makes the income distribution less fair. An increase in γ while holding Δ constant would then generate a decline in the redistribution implemented by a government maximizing the welfare of the median voter.

However, the accumulated wealth of dynasties reflects also redistributions that

[6] To stress the point, let assume that the median voter does not care about his private utility at all, so that the first line in (6) would be equal to zero. Then the choice of the optimal tax rate would be driven entirely by fairness considerations captured by the parameter γ. Small changes in the preference for fairness could then easily translate into immense changes of the tax rate set by the government. The presence of sufficiently strong selfish motivation thus prevents the tax rate from being implausibly sensitive to small variations in the preference for fairness.

occurred in the past (τ). The undeserved component of current wealth due to those past redistributions rationalizes further redistribution after increase in fairness preference γ. This offsetting effect explains why in laissez-faire countries with no luck heterogeneity the derivative $\frac{\partial \tau_t}{\partial \gamma}$ has an ambiguous sign and a smaller magnitude than in the countries characterized by inequality due to luck. In egalitarian countries the absence of "fair heterogeneity" ($\sigma_\delta^2 = 0$) and the history of past redistribution go in the same direction, yielding an unambiguously positive and relatively large value of $\frac{\partial \tau_t}{\partial \gamma}$.

To sum up, introducing an exogenous shock to preference for fairness (γ) into the theoretical framework of Alesina and Angeletos (2005) has different implications in the laissez-faire and egalitarian regimes. In egalitarian countries a positive (negative) shock to fairness preference leads to an unambiguous increase (decrease) in the redistribution level. In the case of the laissez-faire countries the sign of the effect is ambiguous and its absolute magnitude is smaller. Thus, in the egalitarian countries the changes in the level of government interventions will be to a larger extent driven by shifts in the public focus between fairness and economic performance compared to the laissez-faire countries.

In the model positive (negative) changes in the redistribution level lead in turn to a decrease (increase) of both inequality and economic growth (see Appendix A). Empirically, one should then observe within egalitarian countries a stronger negative co-movement of redistribution and inequality as well as a stronger negative co-movement of redistribution and growth. This would imply a stronger positive co-movement of inequality and growth in those countries. Situation will be different in countries where people see income inequality as consequence of different skills and work ethos. There the dynamics of government interventions will be dominated by the allocative and stabilization role of state rather than equity considerations. Consequently, the described pattern of co-movements between government interventions, inequality and growth will be less pronounced in such laissez-faire countries.

3 Econometric Methodology and Instrumentation Strategy

The main point of the paper is to ask whether cultural background affects the inequality-growth dynamics within countries. It is therefore natural to use panel data techniques that control for country fixed effects. There are at least two other reasons to focus on within-country estimation techniques. First, the bulk of recent empirical growth literature seems to agree, that controlling for the omitted country-specific effects is crucial in the context of growth econometrics. The

majority of panel data growth studies therefore rely on within-group estimation rather than on random effects estimation (Durlauf et al. 2005, p. 629). This applies to the studies looking at the effects of inequality on economic growth as well. Second, since Forbes (2000) most of the controversy in the literature on the growth-inequality nexus is associated with fixed effects panel data studies.

The empirical model in the paper is represented by the following dynamic specification that controls for fixed effects and has become standard in recent growth literature:

$$y_{it} = \alpha y_{it-1} + \beta X_{it} + n_i + h_t + v_{it} \tag{9}$$

where y represents the level of output, X is a vector of regressors, h_t are the time dummies, n_i capture the unobserved country-specific effects and v_{it} is the error term. The length of the time period in the panel data structure is five years, as usual in the literature. This relatively low frequency should eliminate short-run business fluctuations and is also motivated by data availability. In order to examine the interactions between cultural background of a country and its internal growth-inequality dynamics, one has to narrow down the general formulation in (9).

In particular, the performed regressions will rely on the following specification:

$$\begin{aligned} y_{it} &= \alpha y_{it-1} + \beta_1 Inequality_{it} + \beta_2 Inequality_{it} * Culture_i + \\ &+ \beta_3 Investment_{it} + \beta_4 Education_{it} + n_i + h_t + v_{it} \end{aligned} \tag{10}$$

where Culture is the dummy variable which takes value 1 for egalitarian countries and value zero for laissez-faire countries.[7] The variable of main interest is the interaction term between this dummy variable and the time varying measure of inequality. A significant coefficient β_2 would imply that the cultural character of a country affects its internal growth-inequality dynamics.[8] The control variables take into account the importance of physical and human capital accumulation for economic growth. I rely on the standard proxies used in the empirical growth literature. $Investment_{it}$ is the share of investment on GDP and $Education_{it}$ represents the average number of years of secondary schooling in country i at time t.

The crucial task is to correctly identify the relevant cultural background of countries, in order to meaningfully divide them into egalitarian and laissez-faire

[7] As a robustness check I also use a continuous culture variable that captures the relative strength of egalitarian versus laissez-faire cultural background.

[8] The cultural background of a country is assumed to be invariant over time. The direct effect of culture on growth will thus by captured by the fixed effects n_i.

ones. In the theoretical framework of Alesina and Angeletos (2005) agents perfectly observe the relative contribution of luck to the income heterogeneity. This full information about the aggregate level of social injustice is surely a simplification, as the authors themselves readily admit (Alesina and Angeletos 2005, p. 974f). The public perceptions of reality often differ from the reality itself. And these perceptions, rather than the truth, are decisive from the political-economy point of view. It does not matter whether rich people are hard-working agents who do not owe a single cent of their wealth to the pure luck ($\sigma_\eta^2 = 0$). As long as the public *believes* that the inequality in their country has nothing to do with differences in effort or skills ($\sigma_\delta^2 = 0$), it will expect from government both economic growth and social equity. The best empirical proxy for an egalitarian country in this framework is thus not the true (and mostly unobservable) dominance of luck over hard work in generating inequality, but the public belief that such dominance prevails. Critically, such beliefs are to large extent determined by the cultural background and historical experience of a given country.

In my line of argument a deeply rooted cultural background shapes long-standing popular beliefs that in turn determine the egalitarian or laissez-faire character of a country. The standard proxies for public beliefs come from representative surveys. A problem is that the answers in such surveys reflect not only deep cultural attitudes of the respondents but also feedback from the real economy. Religion is a natural choice if one wants to identify the part of beliefs that is culturally determined and therefore exogenous to the contemporaneous economic situation in the country. Previous work (Guiso et al. 2003, 2006) already established a significant link between religion and economic beliefs at the individual level. The focus here is on the relationship at the aggregate level: how the cultural environment shapes economic beliefs of a representative agent in a given country. I therefore look at the religious composition of the population, which stands for a broader notion of countries' cultural background. In particular, I employ the shares of various religious denominations in the population as instrumental variables for the average survey response in a given country. This corresponds to running the following cross-sectional regression:

$$Beliefs_i = \alpha + \beta \text{ReligionShares}_i + u_i \tag{11}$$

The instrumented value of the survey response ($\widehat{Beliefs_i} = \widehat{\alpha} + \widehat{\beta}\text{ReligionShares}_i$) thus represents the culturally determined component of people's beliefs about magnitude of unfair income heterogeneity in a given country. I use this value to divide the countries into equally large groups of egalitarian and laissez-faire societies. Crucially, this division occurs after instrumenting the beliefs by the religious composition. This approach enables to distinguish between societies whose cultural background favours rather laissez-faire attitudes and societies that culturally tend

to more egalitarian views. The econometric specification in (10) enables then to examine whether the relationship between inequality and growth differs across these two groups of countries. Given the two-step procedure (variable $\widehat{Belief}s_i$ is estimated from (11) rather than observed) I will rely on bootstrapped standard errors when estimating regression (10).

The choice of an appropriate estimation technique plays an important role in this econometric framework. The specification in (10) controls for country fixed effects. The OLS estimation will therefore not suffer from the bias caused by the presence of non-observable country specific factors that can be correlated with included regressors.

However, the standard fixed effects estimation takes into account neither the presence of lagged dependent variable in the dynamic specification nor the potential endogeneity of other explanatory variables. To take care of these two problems Arellano and Bond (1991) developed an estimator, now known as the difference GMM estimator. This panel data estimator takes the first-difference of (10) and then uses lagged values in levels of variables as instruments. The estimator is consistent if the instruments are valid and the residuals in the first-differenced equation display no second-order serial correlation.[9] The advantage of the GMM framework is the possibility for testing the validity of those assumptions. The standard tools for this are the Sargan test of overidentifying restrictions and the Arellano-Bond tests for serial correlation. The difference GMM estimation was first applied to examine the inequality-growth link by Forbes (2000).

There are two potential problems with the use of the original difference GMM estimation - overfitting and weak instruments. The first problem can occur when the researcher uses all available lagged value as instrumental variables, as was done by Forbes (2000). In this case the number of instruments gets easily too large relative to the size of the cross-section, which results in a finite sample bias. A natural remedy is to reduce the number of instruments by using fewer lags than available. The second problem is more fundamental. When time series are persistent, the lagged levels of variables will represent only weak instruments for the first differences. This leads to both finite sample bias and weak identification when using the difference GMM estimation.[10] As pointed out by Bond et al. (2001), it is a quite realistic scenario in the context of growth empirics. In practice, both problems can be detected by looking at the estimated coefficient on the lagged dependent variable. In this case, overfitting and weak instruments lead to a downward finite sample bias. The within-estimation suffers from the same problem. So if the coefficient on the lagged dependent variable estimated by GMM

[9] On the other hand, the first-order serial correlation is expected to be negative. For details see Bond (2002) and Bond et al (2001).

[10] For a more detailed treatment of this issue see e.g. Bond (2002).

is close to or even below the value obtained by within estimation, one has to assume the presence of overfitting and/or weak instruments. Additionally, the p-value for the Sargan test close to one also signals the presence of overfitting.

The system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) deals with the problem of weak instruments. In case of highly persistent series this estimator has superior finite sample properties and achieves better identification than the difference GMM estimator.[11] Intuitively, the system GMM estimator does not rely exclusively on the first-differenced equations, but exploits also information contained in the original equations in levels.[12] This proves to be helpful especially in case of highly persistent series typical for the variables used in the growth regressions. In the context of inequality and growth, the system GMM estimation was used e.g. by Voitchovsky (2005).

The dynamic GMM estimators used here are asymptotically consistent, but have a relatively large variance in finite samples compared with the standard Least-Squares Dummy Variables (fixed-effects) estimator. Kiviet (1995) developed a bias-corrected Least-Squares Dummy Variables (LSDVC) estimator which takes this trade-off between consistency and efficiency into account. Using Monte Carlo simulations, Kiviet (1995) shows that in finite samples LSDVC estimator often outperforms GMM estimation techniques. The advantages of LSDVC estimator are especially pronounced in cross-country dynamic panels like the one in this paper. The dynamic GMM methods were namely first developed for microeconomic panel data with short time (T) and large cross-sectional (N) dimension and their desirable asymptotic properties are derived when $N \to \infty$. Judson and Owen (1999) document that for a standard macroeconomic panel with a small cross-sectional dimension, LSDVC estimator routinely outperforms the GMM estimators.[13] In this paper I rely on the improved version of LSDVC estimator developed by Bruno (2005) which is applicable also to unbalanced panels. To document the robustness of the results and for better comparison with existing inequality-growth literature, I employ also standard fixed-effects and system GMM estimation techniques.

[11] For details see Bond (2002), Bond et al. (2001) and the references cited there.

[12] Formally, the system GMM estimator imposes a stationarity restriction on the initial conditions. This assumption yields additional moment conditions, which enable to use lagged first-differences as valid instruments for the level equations. For details see Bond (2002) and Bond et al. (2001).

[13] Judson and Owen (1999) use in their simulations N=20 or N=100 and T=5, T=10, T=20 or T=30. This corresponds to a standard macroeconomic dynamic panel like the one used in this paper.

4 Data

Given the focus of the paper, it is essential to find a suitable proxy for perceived unfairness of income heterogeneity across countries. I use the data from the World Value Survey (WVS), which represents probably the most comprehensive database of social and economic beliefs. The WVS has recently become a widely used source in recent empirical literature on the role of beliefs for economic outcomes (Alesina et al. 2001, Guiso et al. 2003). I have chosen to focus on the question about the main determinant of success in life. In a representative opinion poll the respondents in each country were confronted with two conflicting statements: "In the long run, hard work usually brings a better life" and "Hard work doesn't generally bring success - it's more a matter of luck and connections". They could choose 1 (means complete agreement with first statement), 10 (complete agreement with second statement) or any number in between. In terms of the theoretical motivation a high value for the average response in a country implies a large (perceived) contribution of luck to the overall income heterogeneity. More formally, it corresponds to a high $\frac{\sigma_\eta^2}{\sigma_\delta^2}$ ratio.

The answer to the above question seems determined mostly by deeper cultural convictions. Yet it still provides a good proxy for the public beliefs regarding the fairness of income differences. The more widespread is the belief that economic success originates in luck rather than in hard work, the more public support for a governmental provision of social equity can be expected.

The choice of a proper proxy for economic beliefs is not innocuous, especially if some authors work with questions comparing the actual and the desirable state of affairs. One example is the question from WVS asking the respondents whether incomes should be made more equal or the country needs larger income differences as incentives. The response yields arguably a better proxy for the attitudes toward redistributive role of the state and was used e.g. by Guiso et al. (2003). However, the endogeneity problem now becomes striking: e.g. in the third wave of the WVS (performed in years 95/96) the average response in Sweden was more "pro-free-market" than in Australia or even in the United States. It is hard to believe that this result does not reflect the attitude of the Swedes to the existing scope of their welfare state rather than their low support for more egalitarian outcomes in general. To be clear, Guiso et al. (2003) look at individual data while controlling for country fixed effects. With this difference-in-difference approach the presented problem is less of an issue. However, here I instrument the average response in countries, hence choosing such a proxy for beliefs would be very problematic. The question about the source of personal success used in this paper minimizes this kind of concerns, as it is an absolute and not a relative measure. In particular, it asks about personal convictions in general and does not involve comparisons

between the existing and the desirable.

Equally important is to find a proper measure of inequality within countries. Until very recently, the majority of the papers in the field used the inequality dataset compiled by Deininger and Squire (1996). This source represented a huge improvement in terms of coverage and data quality and hence allowed for the first time the use of panel estimation in the inequality-growth context. However, Atkinson and Brandolini (2001) brought forward serious criticism regarding the comparability of those data across countries and over time. I rely therefore on the University of Texas Inequality Project (UTIP) dataset recently created by James K. Galbraith and associates.[14] In particular, I use their Estimated Household Income Inequality (EHII) data set which exploits the econometric relationship between UTIP-UNIDO data on industrial pay inequality and the extended Deininger-Squire dataset while accounting for different types of data sources (income versus expenditure, household versus per capita, gross versus net).[15] This approach yields a consistent measure of inequality that allows for better comparability across space and over time.

The measure for government interventions comes from the Government Size Index by the Fraser Institute and captures government consumption, transfers and subsidies, government enterprises and investment as well as top marginal tax rates.[16]

The remaining variables come from the standard sources. Output and investment share are from the Penn World Table and educational attainment from the Barro-Lee dataset. The religious data come from the Religion Adherence Data Set by Robert Barro and comprise the percentage of population belonging to five religious denominations - Catholics, Protestants, other Christians (e.g. Evangelicals), Eastern religions (comprising Taoism and Confucianism among others) and Hinduists/Buddhists.

5 Empirical Results

In this section I provide empirical evidence supporting the theoretical predictions of the paper. First, I present the results of the first stage regression (equation 11).

[14] Another source of inequality data considered to be superior to the Deininger-Squire dataset in terms of data quality and comparability is the Luxembourg Income Study dataset used e.g. by Voitchovsky (2005). However, this database focuses mostly on developed OECD countries, so the improved data quality comes at the cost of significantly reducing the sample size.

[15] For the dataset and further details on methodology see http://utip.gov.utexas.edu

[16] The original Government Size Index measures the magnitude of economic freedom with higher values of index standing for less interventions of state in economy. I rescaled the index, so that in this paper higher index values mean higher level of government interventions.

These allow to divide countries according to their egalitarian or laissez-faire cultural background. Next, I show evidence for the presence of mechanism underlying my story. In particular, I demonstrate that negative correlation between changes in state interventions on one side and inequality (and to a lesser extent growth) on the other hand is stronger within egalitarian countries. Finally, I turn to reduced form estimates, showing that the inequality-growth link tends to be more positive in countries with an egalitarian cultural background.

The estimation results of (11) are reported in the Table 1 and confirm that countries' cultural background has significant impact on people's economic beliefs. Higher proportions of mainstream Christians (Catholics and mainstream Protestants) and disciples of Eastern religions (such as Taoism or Confucianism) reinforce the egalitarian beliefs in a country. People in countries characterized by a higher share of other Christians (e.g. Evangelicals) and Hinduists/Buddhists tend to have more laissez-faire attitudes. Coefficients for all religious groups are highly significant and the overall F-statistics is 11.03. The adjusted R^2 is above 31 per cent. I use the estimated coefficients to compute the instrumented value of beliefs for every country. This value then serves to divide the sample into egalitarian and laissez-faire countries. The culture dummy capturing an egalitarian background is equal to one for countries whose instrumented value for beliefs is above median of the sample. Table 2 provides more detail.

Table 1: Cultural Content of Economic Beliefs

Dependent variable is the average belief in luck as main determinant of success in life. mainchrist70, othchrist70, hin_bud70, easrel70 are the shares of Mainstream Christians (Catholics and Protestants), other Christians, Hinduists and Buddhists and disciples of Eastern religions in the country's population in the year 1970. Significance level (p value) derived from robust standard errors is in square brackets.

	(1)
main_christ70	1.142
	[0.022]
othchrist70	-2.877
	[0.002]
hin_bud70	-1.060
	[0.037]
easrel70	2.231
	[0.012]
Constant	3.793
	[0.000]
Observations	38
F-statistics	11.03
R-squared	0.386
Adjusted R-squared	0.311

Table 2: Egalitarian versus Laissez-Faire Cultural Background of Countries

Country	Instrumented Beliefs	Culture Dummy
India	2.909976	0
South Africa	3.245476	0
United States	3.300437	0
Japan	3.497883	0
Bangladesh	3.610849	0
Pakistan	3.782338	0
Turkey	3.794984	0
Canada	3.798707	0
Australia	3.979676	0
Korea, Republic of	4.053463	0
New Zealand	4.127990	0
Philippines	4.217050	0
Chile	4.252233	0
China	4.303395	0
United Kingdom	4.307251	0
Netherlands	4.329858	0
Dominican Republic	4.435601	0
Taiwan	4.467161	0
Uruguay	4.498932	0
Sweden	4.611602	1
Iceland	4.634876	1
Mexico	4.691147	1
Brazil	4.710959	1
France	4.719552	1
Portugal	4.735952	1
Venezuela	4.745810	1
Argentina	4.778557	1
Italy	4.785325	1
Belgium	4.786256	1
El Salvador	4.797851	1
Austria	4.831358	1
Finland	4.840032	1
Denmark	4.863513	1
Ireland	4.870833	1
Norway	4.871383	1
Spain	4.881791	1
Peru	4.891136	1
Malta	4.921308	1

In the story underlying this paper governments vary the degree of state interventionism in order to meet the shifting demand for a socially acceptable level of inequality driven by shocks to fairness parameter γ. Simultaneously, the alternation of government interventions affects economic performance as well. After identifying the cultural background of countries, I examine whether the outlined mechanism is stronger within the egalitarian countries. Tables 3 and 4 provide support for this theoretical prediction by investigating the correlation patterns of first-differenced economic variables within countries.[17]

Table 3 shows that increases in state interventions are generally associated with decreases in inequality and vice-versa. Importantly, the negative correlation between changes in interventions and changes in inequality is stronger for the group of egalitarian countries. The difference between mean correlations of the two country groups is both quantitatively important and statistically significant at 3 per cent level.

The evidence for a negative effect of an increase in government interventions on economic performance is less clear-cut, but still present. Table 4 provides the details. On the one hand, there is no link between changes in redistribution and economic performance within laissez-faire countries. On the other hand, surges in interventions are associated with decelerating economic growth within egalitarian countries.[18] The difference between average correlations in both groups is significant at 12 per cent level.

[17] Too few data points for a given country could generate spuriously high correlations close to -1 or 1. To avoid this, only countries with at least 6 observations are considered when computing within correlations in Tables 3.3 and 3.4. For that reason the number of all countries is lower than in the growth regressions reported later.

[18] The table reports only the standard 95% confidence interval, but the mean correlation for egalitarian countries becomes significantly negative at 6% level. Concretely, the 94% confidence interval is (-0.295; -0.005).

Table 3: Correlation of Changes in Inequality and Government Interventions within Countries

Countries (Observations)	Mean (Std Error)	Standard Deviation	95 % Confidence Interval
Laissez-Faire (14)	-0.233 (0.091)	0.342	(-0.430 ; -0.036)
Egalitarian (12)	-0.519 (0.081)	0.279	(-0.696 ; -0.342)
All Countries (26)	-0.365 (0.067)	0.341	(-0.503 ; -0.227)
Difference	0.286 (0.124)		(0.030 ; 0.541)

Mean Comparison Test	
t-Statistics	t = 2.308
Significance Level	0.030

Table 4: Correlation of Changes in Growth and Government Interventions within Countries

Countries (Observations)	Mean (Std Error)	Standard Deviation	95 % Confidence Interval
Laissez-Faire (15)	0.018 (0.075)	0.289	(-0.142 ; 0.178)
Egalitarian (15)	-0.150 (0.071)	0.275	(-0.302 ; 0.002)
All Countries (30)	-0.066 (0.053)	0.290	(-0.174 ; 0.0420)
Difference	0.168 (0.103)		(-0.043 ; 0.379)

Mean Comparison Test	
t-Statistics	t = 1.632
Significance Level	0.114

Finally I examine whether the relevance of countries' cultural background can still be detected in the reduced form relationship between inequality and growth. Tables 3 and 4 affirm that the culturally determined beliefs can alter the political economy mechanism driving the within country dynamics between redistribution on one side and inequality or growth on the other side. Given this evidence, the reduced form estimates might reveal different pattern of inequality-growth relationship in egalitarian and laissez-faire countries. To see whether this is the case, I run a series of growth panel data regressions based on (10) that control for country fixed effects and thus capture the dynamics within countries.

Table 5 reports the results of three panel data regressions: the standard within estimation, the system GMM estimation with a reduced number of instruments and bias-corrected Least-Square Dummy Variables (LSDVC) estimation. The dependent variable is the level of output. The independent variables are inequality and the usual controls - the share of investment on GDP and the average number of years of secondary schooling. Time dummies are included in all regressions. The novelty is the inclusion of an interaction term between inequality and dummy capturing economic beliefs. The dummy takes value one for egalitarian countries and value zero for the laissez-faire ones.

The first column of Table 5 reports the results of a standard fixed effects estimation. The coefficient on the interaction term is positive and significant at 10% level. This means that the positive correlation between variation in inequality and growth is stronger within egalitarian countries. The difference is quantitatively important, as the point estimate for the coefficient on the interaction term is almost the double of the point estimate for the inequality coefficient.

To account for the presence of lagged dependent variable among the regressors and the potential endogeneity of other right-hand-side variables, I turn to the GMM estimation developed by Arellano and Bond (1991) and improved by Arellano and Bover (1995) and Blundell and Bond (1998). In other words, I employ the system GMM estimation with a reduced set of instruments. As the focus of the paper lies on the interplay between culture and inequality-growth dynamics, I employ one lag of inequality and one lag of the inequality-culture interaction term as instruments. Given the importance of the lagged dependent variable in this framework, I also include a second lag of the output into the instrument set. The results are shown in the second column of Table 5. The estimated coefficient for the interaction term is still positive, confirming a stronger positive co-movement of inequality and growth within egalitarian countries. The significance level for the interaction term slightly increases, despite the decrease in the point estimate.

The use of the system GMM thus leads to an improvement in the precision, with which the difference between egalitarian and laissez-faire countries can be estimated. The Arellano-Bond tests for autocorrelations and the robust Sargan

test are also satisfied. Moreover, overfitting does not seem to be a problem with the applied instrument set, as the p-value for the Sargan test is firmly below 1. The GMM system approach is also supposed to correct for downward bias on the coefficient of the lagged dependent variable present in other within estimations. And indeed, the coefficient on lagged output is now higher than in the fixed effects estimation.

The last column reports the results for the LSDVC estimator. The stronger co-movement of inequality and growth within egalitarian countries survives when using this regression technique.

So far I classified every country as either egalitarian or laissez-faire. This binary approach was motivated by two steady states derived in Alesina and Angeletos (2005). In reality, countries' cultural background can cover the whole range from strictly laissez-faire to strongly egalitarian. As a robustness test I therefore test whether the strength of egalitarian cultural background intensifies the positive co-movement of inequality and growth within countries. I use the instrumented value of peoples' belief in "luck as a main source of success in life" from second column of Table 2. This continuous variable is a proxy for the strength of the egalitarian cultural background in a given country. Table 6 reports the results employing this continuous cultural proxy. The specification and regression techniques (standard fixed effects estimation, system GMM, LSDVC) are the same as in Table 5, but the inequality is now interacted with a continuous cultural variable rather than with a culture dummy.

The results confirm that a stronger egalitarian cultural background generates a starker co-movement of inequality and growth within countries. The interaction term is always positive and with the exception of system GMM estimation also significant. In the case of standard within (fixed effects) estimation and LSDVC estimation, the significance level is now higher than in the case of culture dummy. The highly significant result in case of LSDVC regression is especially noteworthy, as this estimation approach is probably the most suitable for macroeconomic dynamic panels with moderate cross-sectional dimension.

Table 5: Presence of Egalitarian Cultural Background and Inequality-Growth Dynamics

The dependent variable is the level of output. All regressions control for country and time fixed effects. The main variable of interest is (Inequality*Culture): the interaction term between inequality and culture dummy from the third column of Table 3.2. The control variables include level of inequality, output level at time t-1 (Lagged Output), average number of years of secondary schooling (Education) and the share of investment in GDP (Investment). Column (1) reports results of the standard fixed effects estimation, column (2) reports results of system GMM estimation (Arellano and Bover 1995, Blundell and Bond 1998) and column (3) reports results of the bias-corrected Least-Squares Dummy Variables estimation (Kiviet 1995, Bruno 2005). Significance level (p value) derived from bootstrapped standard errors is in square brackets.

	(1) Fixed Effects	(2) System GMM	(3) LSDVC
Inequality	0.006	-0.002	0.008
	[0.120]	[0.677]	[0.035]
Inequality*Culture	0.010	0.002	0.009
	[0.100]	[0.066]	[0.072]
Lagged Output	0.726	0.829	0.820
	[0.000]	[0.000]	[0.000]
Education	0.026	0.024	0.021
	[0.021]	[0.146]	[0.080]
Investment	0.011	0.017	0.010
	[0.000]	[0.000]	[0.000]
Constant	1.832	1.238	
	[0.002]	[0.054]	
Observations	260	260	260
Number of Countries	38	38	38
Arrelano-Bond Test for AR(1)		0.001	
Arrelano-Bond Test for AR(2)		0.773	
Sargan-Hansen Test (robust)		0.461	

Table 6: Intensity of Egalitarian Cultural Background and Inequality-Growth Dynamics

The dependent variable is the level of output. All regressions control for country and time fixed effects. The main variable of interest is (Inequality*Culture): the interaction term between inequality and the culturally determined component of people´s beliefs from the second column of Table 3.2. The remaining variables are defined in Table 3.5. Column (1) reports results of the standard fixed effects estimation, column (2) reports results of system GMM estimation (Arellano and Bover 1995, Blundell and Bond 1998) and column (3) reports results of the bias-corrected Least-Squares Dummy Variables estimation (Kiviet 1995, Bruno 2005). Significance level (p value) derived from bootstrapped standard errors is in square brackets.

	(1)	(2)	(3)
	Fixed Effects	System GMM	LSDVC
Inequality	-0.038	-0.010	-0.036
	[0.126]	[0.129]	[0.087]
Inequality*Culture	0.011	0.001	0.011
	[0.064]	[0.334]	[0.022]
Lagged Output	0.728	0.873	0.817
	[0.000]	[0.000]	[0.000]
Education	0.287	0.007	0.028
	[0.005]	[0.663]	[0.048]
Investment	0.011	0.014	0.010
	[0.000]	[0.000]	[0.000]
Constant	1.811	1.175	
	[0.002]	[0.071]	
Observations	260	260	260
Number of Countries	38	38	38
Arrelano-Bond Test for AR(1)		0.001	
Arrelano-Bond Test for AR(2)		0.552	
Sargan-Hansen Test (robust)		0.299	

The overall message from the reduced form regressions is that the internal dynamics of inequality and economic performance differs between egalitarian and laissez-faire countries. Specifically, the two variables seem to be more positively correlated within countries that for cultural reasons believe that luck and good connections rather than hard work lead to personal success. Both the presence and intensity of an egalitarian cultural background play an important role in shaping the joint dynamics of real economic variables like inequality and growth within countries over time.

6 Conclusion

This paper documents a stronger dynamic interplay between governmnet interventions, inequality and growth in countries with an egalitarian cultural background. The presented results suggest that one should be careful when inferring causality from the positive inequality-growth link found in the within estimations without accounting for possible cultural differences across countries. This reflects a more general problem in the literature. Cross-section and within estimation are all too often regarded as alternative econometric techniques equally well designed to address the same questions. However, the use of within estimation fundamentally changes the economic interpretation of the regression results.[19] This is especially true if cultural factors affecting the internal political-economy process come into play.

The paper also made a more general and arguably a more fundamental contribution to the booming literature on culture and economics. The idea that cultural factors have a strong impact on long-run economic outcomes has meanwhile gained a broad acceptance in our profession. This paper examines a more subtle channel through which culturally determined beliefs affect the economic reality. It shows that a cultural background can shape the joint dynamics of economic variables within countries over time. Here I focused on the relationship between government interventions, inequality and growth. An interesting direction for a future research could explore whether cultural factors shape the within-countries dynamics of other economic variables as well.

[19] Durlauf et al. (2005) make this point in the context of $\beta-$convergence. Their summary of the discussion between Islam (1995,1998) and Lee et al. (1998) shows how switching between different estimation techniques substantially changes the economic interpretation of the empirical results.

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Appendix A: Impact of Redistribution on Inequality and Growth

This appendix documents a negative correlation between redistribution and inequality as well as between redistribution and economic growth within the theoretical framewok of Alesina and Angeletos.

One can show - building upon the derivation from the technical appendix of Alesina and Angeletos (2005) - that for a stationary history ($\tau_s = \tau$ for all previous generations $s \leq t-1$) wealth in period t is given by:

$$\begin{aligned} w_{it} &= (1-\tau_t)^2\delta_i + (1-\tau_t)\eta_i + (1-\tau_t)\alpha[\frac{1}{1-\alpha(1-\tau)}((1-\tau)^2\delta_i + (1-\tau)\eta_i + G)] + G_t \\ &= \{(1-\tau_t)^2 + (1-\tau_t)\frac{\alpha}{1-\alpha(1-\tau)}(1-\tau)^2\}\delta_i + \\ &\quad +\{(1-\tau_t) + (1-\tau_t)\frac{\alpha}{1-\alpha(1-\tau)}(1-\tau)\}\eta_i + (1-\tau_t)\frac{\alpha}{1-\alpha(1-\tau)}G + G_t \end{aligned}$$

The variance of wealth, which gives a natural measure of inequality in this model is thus given by:

$$\begin{aligned} Var(w_{it}) &= \{(1-\tau_t)^2 + \frac{\alpha}{1-\alpha(1-\tau)}(1-\tau_t)(1-\tau)^2\}^2\sigma_\delta^2 + \\ &\quad +\{(1-\tau_t) + \frac{\alpha}{1-\alpha(1-\tau)}(1-\tau_t)(1-\tau)\}^2\sigma_\eta^2 \\ &= \{(1-\tau_t)^2 + \frac{\alpha}{1-\alpha(1-\tau)}(1-\tau_t)(1-\tau)^2\}^2\sigma_\delta^2 + \\ &\quad +(1-\tau_t)^2[1 + \frac{\alpha(1-\tau)}{1-\alpha(1-\tau)}]^2\sigma_\eta^2 \end{aligned}$$

which is obviously decreasing in τ_t.

Now we turn to the relation between redistribution and economic growth. Evaluating the pre-tax wealth (equation 1) at the optimum yields:

$$\begin{aligned} y_{it} &= A_{it}[(1-\tau_t)A_{it}\beta_{it}] + \eta_{it} + \alpha w_{it-1} \\ &= (1-\tau_t)\delta_{it} + \eta_{it} + \alpha w_{it-1} \end{aligned}$$

Aggregating output across all agents gives

$$\begin{aligned}\int_i y_{it} &= (1-\tau_t)\int_i \delta_{it} + 0 + \alpha \int_i w_{it-1} \\ \overline{y}_t &= (1-\tau_t)\overline{\delta}_t + \alpha \overline{w}_{t-1}\end{aligned}$$

The fact that the state has a purely redistributive role (no public goods) and there is no waste in redistribution (see equation 2) implies equality between pre-tax and disposable wealth of the average agent:

$$\overline{y} = \overline{w}$$

Combining the last two expressions finally yields:

$$\begin{aligned}\overline{y}_t &= (1-\tau_t)\overline{\delta}_t + \alpha \overline{y}_{t-1} \\ \Delta\overline{y}_t &= (1-\tau_t)\overline{\delta}_t + (\alpha - 1)\overline{y}_{t-1} \\ \text{where } \Delta\overline{y}_t &\equiv \overline{y}_t - \overline{y}_{t-1}\end{aligned}$$

Besides the standard convergence effect ($\alpha - 1 < 0$) economic growth is also decreasing in the level of redistribution τ_t.